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Water quality degradation in Kerala:

The challenge ahead

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Kerala is perhaps the only state in India that has achieved sustainable development goals in key elements of the social sector well in advance. However, the State's performance in the water sector is not at the desired level. Kerala is well endowed with water resources receiving roughly 3000 mm annual rainfall, two monsoon seasons, 44 rivers, and several natural and impounded water bodies. However, the state also suffers from the erratic nature of rainfall, problems of water shortage in some parts of the state during some times in the year. Water supply schemes in Kerala cover only 56 per cent of the total population by 2019. It has also been reported by the Census 2011 data that the majority of people in Kerala depends on well water for drinking and household use. The problem is compounded due to degradation of water quality which is a serious emergent issue as evident from the data obtained from the State Pollution Control Board, Central Pollution Control Board and various case studies undertaken by academicians and professionals. Both surface and ground waters are contaminated and in many cases, these water sources are rendered unsafe for human consumption and survival of aquatic lives. Deterioration of water quality can severely impact human health and impinge upon the economy. This article draws attention to the water quality problem in Kerala and raise a couple of issues warranting deliberations at the policy level.

The Central Pollution Control Board monitors the water quality of rivers, lakes, ponds, canals, and groundwater all over India as part of the national water monitoring programme. It has identified 21 river stretches in Kerala for initiating restoration programme under priority I (1 river stretch), Priority IV (5 river stretches), and priority V (15 river stretches) primarily based on BOD (Biological Oxygen Demand) value. The priority I stretch is along Karamana down stream to Thiruvalla. This stretch shows the 'urban river syndrome', a term coined in

recent years to designate the river stretches associated with urban areas that lost all its ecological functions and are highly degraded. Comparing CPCB data for the years 2012 and 2017 it emerges that number of stations recording BOD value of >2 mg/l (cut off value for polluted water) has increased in all cases (Table 1). It indicates that water quality is deteriorating over the years and more and more water bodies are recording elevated BOD values. The nutrient loading of water bodies is also increasing and in some cases, it is alarming (David, 2016). 47 percent of all water sample sources tested is found contaminated, especially bacteriological contamination (SPB, 2018). The Coliform content of water is also increasing. Unsafe water, lack of sanitation, and hygiene are the leading cause of mortality and morbidity in several countries. Kerala has recorded a 35.6 per cent increase in waterborne diseases from 2012 to 2016.

Table 1. Change in BOD value of stations monitored by Central Pollution Control Board, 2012 and 2017

Type of water bodies	Number of stations monitored	Number of stations recorded > 2mg value				Total number of stations recorded increase in the maximum value
		2012		2017		
		Max	Mean	Max	Mean	
Rivers	70	34	10	54	19	45
Ground water	30	4	2	16	8	20
Lakes and ponds	18	13	8	14	7	8
Canal	3	3	1	3	2	1

Source: Central Pollution Control Board, 2012, 2017

Analyses of tested data on water source contamination in Kerala indicate wide spatial variability from 27 per cent in Trissur to 59 per cent in Kollam (SPB, 2018). Correlating this distribution to population density, the proportion of the urban population and per capita income does not show any appreciable trend. Kerala's case of relatively better performance in the development sector during the past couple of decades but the growing deterioration of water quality is contrary to that hypothesized through the Environmental Kuznets Curve (EKC). This indicates that water quality is a growing problem with development. It is a complex issue and warrants deeper investigation. A similar trend has been observed in the case of many developing countries in the world (Markandya, 2004).

Water is a heritage resource and one of the principal drivers of the ecosystem. It has several benefits with use and non-use value. As an amenity, freshwater can be directly used for household purposes, recreation, and a clean environment. There is a clear benefit of the lower

cost of treatment to supply drinking water. Besides, water has cultural and religious value. The cost of water pollution is yet to be worked out at the state level. However, an earlier study at the national level indicated that the estimated annual cost of water pollution in India is between 1.73 to 2.1 per cent of the national GDP (Murthy and Surendar Kumar, 2011). This does not include the non-use value.

The Principal drivers of the change in water quality are anthropogenic activities. Growing urbanization, distributed settlements, intensive use of land, plantation agriculture, lack of control on effluent discharge, and ineffective sewage management all together are contributing to this emergent scenario. Water quality is a broader management issue and it is primarily a challenge of governance. The relevant factors are control of point and nonpoint sources like treatment of municipal and industrial wastewater, policy to control non-point source, and agricultural runoff controlling fertilizer and pesticide use. The use efficiency of fertilizer is coming down. Fifty-year data analysis of the use of Nitrogen fertilizer at all India level indicated that present nitrogen use efficiency is in the range of 30 per cent to 35 per cent (Singh, 2017). It indicates that around 65 to 70 per cent of nitrogen fertilizer, presently applied, is not absorbed by plants, rather it may potentially lead to environmental pollution impacting surface and groundwater.

Water quality degradation through nutrient enrichment and contaminant pollution is perhaps one of the four main drivers to cause blue water (water in the river, surface water bodies, and aquifer) scarcity and therefore warrants immediate policy intervention for increasing pollution abetment measures and water reuse. In a water scarcity situation where the availability of rainwater is more or less constant or reducing, as indicated in several studies, water quality management through source sustainability calls for high priority. At present, the general focus is on the management of quantity of water including investment in storage, flood control, watershed management, and saving scarce water resources. There is little discussion on improving the quality of water with the necessary urgency. Technology is not the only solution. In one hand, it escalates the cost of treatment as the pollution level of water is elevated, on the other hand growing use of technology increases externality. Traditionally, people in Kerala had the minimum externality in the matter of water use that is gradually withering away with growing water quality degradation.

The threats or drivers affecting ecosystem services operate on different spatial and temporal scales and are often not independent of one another and there exists a mismatch between the

scales at which ecosystem functions and the scales at which institutions operate. Analysis of these dynamics is important to understand the nature of the problem and take decision on which threats to be dealt with by local users, and which requires complex solutions that include cooperation and management strategies - important considerations for governance. There are significant beginning in Kerala with several initiatives. The river restoration programmes in Alappuzha under Haritha Mission are noteworthy. It is important to learn lessons from these initiatives, strengthening them for further improvement in water quality as one of the main foci as advocated under Sustainable Development Goals (Goal no 6) of the UN Agenda 2030.

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